HANEY

1190400G Madison Co Granite City / Reilly
Subpart F

REILLY TAR & CHEMICAL CORPORATION

TELEPHONE: 317/638-7531
CABLE RETAR INDIANAPOLIS
TELEX 27-404

1510 MARKET SQUARE CENTER
151 NORTH DELAWARE STREET
INDIANAPOLIS, INDIANA 46204

September 22, 1983

Mr. Richard J. Carlson
Director
Illinois EPA
2200 Churchill Road
Springfield, Illinois 62706

Dear Mr. Carlson:

On September 13, 1983 we received a letter from Mr. Mark A. Haney of the Illinois Division of Land Pollution Control. Mr. Haney stated that on the basis of our first year groundwater monitoring background data, we have exceeded some standards contained in Section 302.304. He further requested that we submit a groundwater quality assessment plan at this time.

We have agreed to comply with his request at this time, and this is to advise you that we are in the process of obtaining an outside consultant who will prepare a plan for submission to your agency as soon as possible. We anticipate the plan should be submitted within thirty days of this date.

Very truly yours,

REILLY TAR & CHEMICAL CORPORATION

W. A. Justin
Director Environmental Control

WAJ/bk

cc: Mr. Mark A. Haney
Illinois EPA

Mr. L. L. Pirtle
Mr. Dan Trieff
Mr. R. Polack
Reilly Tar & Chemical Corporation

REILLY TAR & CHEMICAL CORPORATION
GRANITE CITY, ILLINOIS
GROUND WATER QUALITY ASSESSMENT

INTRODUCTION

The purpose of this report is to describe ground water quality in the vicinity of the wastewater pond at the Reilly Tar & Chemical Corporation's Granite City facility. The assessment was conducted in general accordance with the scope of work described in our proposal dated December 2, 1983 (as amended January 11, 1984) and as authorized by Reilly Tar & Chemical Corporation Purchase Order 13-188.

The facility is located in the valley lowlands of the Mississippi River in Section 19 (Range 9 west, Township 3 north) of Madison County in southwestern Illinois (Figure 1). The plant produces coal tar products, including creosote, from a crude coal tar byproduct. This material is purchased from local blast furnaces and coke-making facilities. The plant has been in operation for approximately 60 years. Wastewater treatment sludges generated in the production of creosote are classified as hazardous (K035) under 40 CFR 261.32. Listed hazardous constituents are:

Creosote	Indeno (1,2,3-cd) pyrene,
Chrysene,	Benzo(a) anthracene
Naphthalene	Dibenzo(a,h) anthracene
Fluoranthene	Acenaphthylene
Benzo(a)pyrene	

The wastewater pond is located in the southwest portion of the site and, until 1983, covered an area of approximately 1.5 acres (Figure 2). Prior to the installation of wastewater treatment tanks at that time, the pond received a mixture of plant effluents including process water from creosote production and demineralizer unit backflush. The pond is now reduced in size and receives only storm water runoff. When the pond is overfilled, water is pumped to the treatment system prior to discharge to an area of vacant land to the west of the pond.

The wastewater pond is regulated as a hazardous waste treatment unit under the Resource Conservation and Recovery Act (RCRA) of 1976 and corresponding regulations of the State of Illinois. Ground water monitoring, conducted in accordance with 40 CFR 265.92 since 1982, detected statistically significant differences in ground water quality downgradient of the unit, as measured by indicator parameters (pH, specific conductance, total organic carbon, and total organic halogen). As required by state regulations, a ground water quality assessment has now been performed. This included installation of five multi-level sampling points, sampling of the ground water, inorganic and organic analyses of the samples, and data interpretation. This report presents the results of the assessment and specifically addresses whether or not there are hazardous waste constituents in the ground water and, if so, their concentrations and the rate and extent of migration.

The text of the report consists of a site description, a discussion of the study results, and conclusions. The field investigation

methodology is described in Appendix A. Appendix B contains the results of chemical analyses as received from the laboratory.

WASTE UNIT CHARACTERIZATION

The plant has been in operation at least 60 years, and the wastewater pond is believed to have been present throughout this period. Lagoon operations were expanded during the 1970s to accommodate storm drainage improvements at the plant. These modifications caused increased flow to the wastewater pond and subsequent use of an adjacent overflow area.

The pond is an unlined impoundment with depths varying from several inches in the overflow area to approximately 10 feet in the pond. Between November 1980 and July 1983, wastewater produced from the production of creosote oil was biologically treated in the wastewater treatment pond. In July 1983, the treatment pond was divided and the accumulated sludge was removed from the closed areas and disposed of offsite. In August 1983, a wastewater treatment plant was placed in operation and the addition of untreated wastewater to the treatment pond was discontinued.

Between November 1980 and July 1983, treated water from the pond was periodically pumped to the overflow area. In August of 1983, a plan was commenced to treat the accumulated sludge in the pond biologically. Since startup of the wastewater treatment plant in August 1983, effluent

from the treatment plant is pumped to the overflow area. Reilly personnel report that the treated effluent contains less than 0.3 mg/L (300 ug/L) phenol. In addition, water from the pond was occasionally pumped to the overflow area until October 1984 in order to control the freeboard level if rain water increased the level in the pond. Since October 1984, water pumped from the pond has been pumped to the treatment plant prior to being discharged to the overflow area.

In order to characterize the wastes in the pond, samples of water and sludge were collected from the wastewater pond and analyzed for the priority pollutant compounds, total organic carbon, total organic halogen, and chloride. Results of the analyses are shown on Table 1.

The results of the analyses indicate that the pond water is characteristically high in chlorides (730 mg/L). The phenol concentration is 767 ug/L. Prior to use of wastewater treatment tanks at the site in October 1983, concentrations of phenol in effluent were higher, on the order of 200 mg/L (200,000 ug/L).

The sludge contained in the remaining portion of the wastewater pond contains priority pollutant polynuclear aromatic hydrocarbon compounds totaling approximately 25 percent by weight. However, most of these compounds have limited solubility. Concentrations in the pond water sample were six orders of magnitude lower than in the sludge, often well below the reported solubility limit. A separate oil phase was not present in the pond samples.

GEOLOGIC AND HYDROGEOLOGIC SETTING

The Reilly Tar & Chemical facility is located in the central portion of the East St. Louis region, in Granite City near the corporation line of the city of Madison. The site is about 2-3/4 miles east of the confluence of the Chain of Rocks Canal and Mississippi River and about 1 mile northwest of Horseshoe Lake, a large lake in an abandoned meander of the river.

The facility is located in the valley lowlands of the Mississippi River in Section 19 (Range 9 west, Township 3 north) of Madison County in southwestern Illinois. The valley lowlands at this point along the Mississippi are approximately 10 miles wide narrowing gradually to the north at Wood River and to the south at Cahokia. The lowlands are approximately level at an elevation of 410 to 415 feet mean sea level (msl) in the Granite City area but to the north a number of terraces are present standing slightly above the floodplain. The eastern margin of the valley lowland is marked by a series of bluffs rising abruptly 150 to 200 feet above the valley to a region of rolling uplands.

The geology of the valley lowlands is described by Schicht (Ref. 1) and consists of alluvial and glaciofluvial fill overlying bedrock strata of Mississippian age. The valley fill materials vary from 100 to 120 feet in thickness throughout much of the area, thinning to the west near the Mississippi River and to the east along the valley bluffs. The lower

materials in the fill consist of sand and gravel deposits, mostly medium to coarse sand and gravel, in which the grain size tends to increase with depth. Recent fine-grained alluvium overlies these deposits and consists of fine sands, silts, and clays. In places, fine-grained materials are also interbedded with the lower sand and gravel. Bedrock underlying the valley fill is believed to be the St. Louis Limestone Formation of Upper Mississippian age.

The coarser sand and gravel deposits in the East St. Louis area of the Mississippi River valley constitute an alluvial aquifer of major importance. Historically, large quantities of ground water have been withdrawn from highly permeable deposits in the lower 30 to 40 feet of the valley fill, mainly for industrial use. Pumping in the region has, however, declined during the past 15 to 20 years from a maximum of over 100 million gallons per day (mgd) to approximately 50 mgd in 1977. Pumping from this area has been extensively investigated by the Illinois State Water Survey and is described in References 1, 2, 3, and 4.

The direction of ground water flow in this area is the result of withdrawal and recharge from a number of sources. Granite City Steel has a total of four Ranney collector wells capable of producing about 3,000 gallons per minute (gpm) each. Two of these wells are in use, mainly during the summer months, to supply water for industrial cooling. Total pumping volumes for 1981 were reported by GCS personnel to be 788 million gallons for collector No. 2 and 800 million gallons for collector No. 3. These wells are located about 1/2 and 3/4 of a mile, respectively, to the

northwest of the Reilly Tar & Chemical facility. The other two collector wells are not extensively used.

Ground water is also withdrawn by pumping from a tubular well 1/2 mile to the northeast. The well is owned and operated by GCS, but the water is used by St. Louis Slag Company for industrial cooling. Pumping is reported to be at a rate of 700 gpm during a 5-day, 8-hour working week.

The major source of recharge to the aquifer in this area is thought to be the 2,500-acre Horseshoe Lake to the southeast with some further contribution from precipitation. Horseshoe Lake is within the "area of diversion" or cone of depression described for Granite City by the most recently available Illinois State Water Survey investigation (Ref. 4). In addition, the reported elevation of the surface of Horseshoe Lake is 404 feet msl (Ref. 9), which is above the water levels usually found in the upgradient wells at the Reilly site. Other possible influences include a major wastewater canal belonging to GCS and located to the east of the Reilly plant, and several areas of surface water accumulation in this portion of Madison County. No additional pumping centers could be identified, although some old well logs were on the state files. All other wells belonging to the Koppers Company (now GCS), and GCS itself are reported to be out of use.

GROUND WATER QUALITY ASSESSMENT

GENERAL

This investigation has three objectives:

- To evaluate whether hazardous waste or hazardous waste constituents have entered the ground water

- If hazardous wastes or hazardous waste constituents are detected in the ground water, to identify the concentrations of these substances in the ground water

- If hazardous wastes or hazardous waste constituents are present in the ground water, to estimate the rate and extent of migration of these substances in the ground water

Previous ground water monitoring results (Table 2) indicate that chloride, phenol, iron, and manganese concentrations were significantly higher in wells downgradient of the wastewater pond.

In order to assess whether hazardous wastes or hazardous waste constituents had entered the ground water, samples were collected from existing monitoring wells (MW-1, MW-2, MW-4, MW-6, and MW-7) on April 19, 1984. These samples were analyzed for priority pollutant organic compounds (acid, base neutral, and volatile fractions).

The results of these analyses (Table 1) showed the presence of fluoranthene, napthalene, and acenaphthylene in the ground water at monitoring locations MW-6 and MW-7. These compounds are listed in 40 CFR Part 261 Appendix VII as constituents of hazardous waste K035 (wastewater sludge from treatment of creosote production effluents). This waste is contained in the wastewater pond. Consequently, it was concluded that hazardous waste constituents had entered the ground water, and an investigation designed to fulfill the second and third objectives was implemented.

All existing on-file geologic, hydrogeologic, and geochemical data pertaining to the site were used in analyzing the data from this investigation and are discussed more fully in that context in subsequent sections.

SITE GEOLOGY AND HYDROLOGY

In the area of the Reilly Tar & Chemical plant, geological conditions in the upper unconsolidated deposits have been investigated for purposes of foundation design and during the installation of monitoring wells (Ref. D&M report 001). The upper alluvial zone is from 18 to 30 feet thick in this area and consists of very fine sand with traces of silt, clay, and silty clay. In some areas of the site, artificial fill extends from the surface to a depth of 4 to 5 feet. The fill materials vary from bricks and construction rubble to carbonaceous residues from

plant operations. The wastewater treatment pond is excavated within the upper fine-grained zone.

Underlying the fine-grained alluvium is a sand deposit which was investigated in six borings to a depth of 40 feet (Ref 1). Boring logs are included in Appendix A for reference. The aquifer materials consist of a relatively homogeneous medium sand with occasional traces of fine and coarse sand.

The depth to the water table at the site varies seasonally and spatially from 5 to 15 feet and was located between elevations 401 and 405 feet mean sea level (msl) on June 7, 1982. In the upper fine-grained deposits, flow is thought to be limited by the relatively lower permeability of the sediments. Water levels at the site indicate a northwesterly slope of the water table across the site suggesting a northwesterly flow of ground water within the medium sand aquifer, possibly due to withdrawal of water from Ranney collector wells at Granite City Steel Company (GCS). In addition, there appears to be local hydraulic mounding due to seepage from the wastewater treatment pond and overflow area.

MONITORING NETWORK

As described in the monitoring program in the approved Ground Water Quality Assessment Plan, 17 additional ground water sampling points were installed at five locations as shown on Figure 2. These consist of